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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/658,463	SATOH ET AL.
	Examiner	Art Unit
	Jin-Cheng Wang	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-30 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-30 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato U.S. Patent No. 6,445,815.

3. Claim 1:

U.S. Pat. No. 6,445,815 to Sato teaches an augmented reality presentation apparatus (figures 6, 16, 18 and 20) for superimposing a virtual object in a real space (column 1, lines 6-23), characterized by comprising:

objective viewpoint augmented reality presentation means (column 1, lines 51-63) for superimposing the virtual object viewed from a first viewpoint position, which differs from a player's viewpoint position, in the real space viewed from the first viewpoint position (figures 6, 16 and 18, column 4, lines 64-67, column 5, lines 1-54, column 12, lines 11-50 and column 16, column 5, lines 1-61), wherein said objective viewpoint augmented reality presentation means includes

First video sensing means for sensing a video of the real space viewed from the first viewpoint position (e.g., the three-dimensional position/posture sensor 101 mounted on the base

100, figures 6, 16 and 18, column 12, lines 11-50, column 16, column 5, lines 1-61 and column 18, lines 5-15);

First video generation means for generating a video of the virtual object viewed from the first viewpoint position (e.g., the position/posture module 201, column 12, lines 28-43 and the image generation module 300, column 12, lines 28-50, OR, the viewpoint position/posture estimation module 201 of the third embodiment, column 15, lines 28-44);

First video composition means for composing an augmented reality video viewed from the first viewpoint position on the basis of the videos of the real space and the virtual object viewed from the first viewpoint position (The depth warping module 203 that warps the depth image at the viewpoint, column 13, lines 32-60), and

Objective viewpoint video display means for displaying the augmented reality video obtained from said first video composition means (HMD 100 of figures 16 and 18, column 12, lines 11-50);

wherein said apparatus further comprises:

augmented reality presentation means for superimposing the virtual object viewed from the player's viewpoint position in the real space viewed from the player's viewpoint position (The Examiner interprets the player's viewpoint position as the observer's viewpoint position of Sato, column 18, lines 5-15, column 4, lines 64-67, column 5, lines 1-54, column 12, lines 11-50, column 13, lines 32-48, and column 15, lines 6-25);

wherein said augmented reality presentation means includes

second video sensing means for sensing a video of the real space viewed from the player's viewpoint position (e.g., virtual camera, column 13, lines 31-48);

second video generation means for generating a video of the virtual object viewed from the player's viewpoint position (e.g., the image generation module 300 of the third embodiment, column 34-43) ;

second video composition means for composing an augmented reality video viewed from the player's viewpoint position on the basis of the videos of the real space and the virtual object viewed from the player's viewpoint position (e.g., depth warping module 203 of the third embodiment, column 16, lines 21-33 and the CG renderer 302 of the third embodiment, column 16, lines 44-61); and

display means for displaying to the player the augmented reality video viewed from the player's viewpoint position (e.g., column 14, lines 1-30, OR, figure 18, LCDs 103 for displaying a rendered image, column 15, lines 19-25).

Claim 2: *The apparatus according to claim 1, characterized in that said augmented reality presentation means further comprises: the second video sensing means for sensing a video of the real space viewed from said player's viewpoint position; the second video generation means for generating a video of the virtual object viewed from said player's viewpoint position; the second video composition means for compositing an augmented reality video viewed from said player's viewpoint position on the basis of said videos of the real space and the virtual object viewed from said player's viewpoint position; and the display means for displaying to the player the augmented reality video viewed from said player's viewpoint position.*

Claim 2 recites all the limitations of claim 1 and adds the limitation of "the second video sensing means," "the second video generation means," "the second video composition means," and "display means." The Sato reference teaches an augmented reality presentation means including a video sensing means such as HMD 100 with a three-dimensional position/posture sensor 101 for sensing a video of the virtual object (column 12, lines 12-27). The Sato reference also teaches a video generation means such as a depth image generation apparatus 200 for generating depth images in correspondence with the right and left viewpoints of the player (column 12-50). Sato further teaches a video composition means such as depth warping module 203 and a CG renderer 302 for compositing an augmented reality video viewed from a player's viewpoint position (column 13, lines 32-60 and column 14, lines 1-29). Finally, Sato teaches display means such as LCDs 103 for displaying a rendered image (column 14, lines 1-29).

Claim 3: *The apparatus according to claim 1, characterized in that said augmented reality presentation means further comprises: the second video generation means for generating a video of the virtual object viewed from said player's viewpoint position; and the display means for displaying to the player the video of the virtual object viewed from said player's viewpoint position on a display surface through which the player can visually see the real space.*

Claim 3 recites all the limitations of claim 1 and adds the limitation of "the second video generation means" and "the display means." The Sato reference teaches a video generation means such as a depth image generation apparatus 200 for generating depth images in correspondence with the right and left viewpoints of the player (column 12-50). The Sato reference further teaches display means such as LCDs 103 for displaying a rendered image (column 14, lines 1-29).

Claim 4: *The apparatus according to claim 1, characterized by further comprising information generation means for generating information that pertains to rendering of the virtual object, and in that said first video generation means and said second video generation means generate videos of the virtual object using the information that pertains to rendering of the virtual object.*

Claim 4 recites all the limitations of claim 1 and adds the limitation of "information generation means" and "generation means generate videos." The Sato reference teaches an information generation means such as the CG renderer 302 that renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint position/posture information (column 14, lines 1-29) and the image generation module 300 that generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image (column 12, lines 44-50).

Claim 5: *The apparatus according to claim 4, characterized in that said information generation means generates information of an outer appearance of the virtual object and information of a position/posture of the virtual object as the information that pertains to rendering of the virtual object.*

Claim 5 recites all the limitations of claim 4 and adds the limitation of "generating information of an outer appearance of the virtual object and information of a position/posture of the virtual object." The Sato reference teaches that the CG renderer 302 renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint *position/posture information* (column 14, lines 1-29) and that the image generation

module 300 generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image (column 12, lines 44-50).

Claim 6: *The apparatus according to claim 1, characterized in that parameters of said first video sensing means are known, and said first video generation means generates the video of the virtual object viewed from said first viewpoint position in accordance with the known parameters.*

Claim 6 recites all the limitations of claim 1 and adds the limitation of "the known parameters." The Sato reference teaches some known parameters of video sensing means such as the focal length of camera 102 (column 10, lines 62-67).

Claim 7: *The apparatus according to claim 1, characterized in that some of parameters of said first video sensing means are variable, said apparatus further comprises measurement means for measuring changes of the parameters, and said first video generation means generates the video of the virtual object viewed from said first viewpoint position in accordance with the parameters measured by said measurement means.*

Claim 7 recites all the limitations of claim 1 and adds the limitation of "variable parameters" and "measurement means." The Sato reference teaches the relative position/posture of the viewpoint of the camera 102 and the estimation module 201 to estimate a change in relative viewpoint position of the camera 102 viewed at different times on the basis of the time-sequentially extracted position/posture information of the camera 102 (column 5, lines 48-54). The Sato reference teaches measurement means in which the position/posture sensor 101

continuously outputs viewpoint position/posture information of the camera 102 along a time axis of the sensor 101 (column 8, lines 42-47).

Claim 8: *The apparatus according to claim 7, characterized in that the parameters of said first video sensing means measured by said measurement means include at least one of a viewpoint position/posture, and zoom ratio.*

Claim 8 recites all the limitations of claim 7 and adds the limitation of "position/posture information." The Sato reference teaches the relative position/posture of the viewpoint of the camera 102 and the estimation module 201 to estimate a change in relative viewpoint position of the camera 102 viewed at different times on the basis of the time-sequentially extracted position/posture information of the camera 102 (column 5, lines 48-54).

Claim 9: *The apparatus according to claim 1, characterized in that when a plurality of first video sensing means equivalent to said first video sensing means are present, said apparatus further comprises selection means for receiving a plurality of videos of the real space from said first viewpoint position from the plurality of first video sensing means, and outputting a video of the real space viewed from said first viewpoint position from one selected first video sensing means to said first video composition means, and said first video composition means generates a video of the virtual object viewed from said first viewpoint position using parameters of the first video sensing means selected by said selection means.*

Claim 9 recites all the limitations of claim 1 and adds the limitation of "selection means for receiving a plurality of first video sensing means." The Sato reference teaches two cameras 102R and 102L for sensing a scene in front of them where image signals that represent an environment scene of a real space sensed by the respective cameras (column 5, lines 1-17) and

depth warping module 203 generate a depth image on the basis of an image *from one camera* depending on the purposes (column 7, lines 1-14).

4. Claim 10:

The claim 10 is a rephrasing of the claim 1 in a method form. The claim is rejected for the same reason as set forth in claim 1.

5. Claim 11:

The method according to claim 10, characterized in that said augmented reality presentation step further comprises: the second video sensing step of sensing a video of the real space viewed from said player's viewpoint position; the second video generation step of generating a video of the virtual object viewed from said player's viewpoint position; the second video composition step of compositing an augmented reality video viewed from said player's viewpoint position on the basis of said videos of the real space and the virtual object viewed from said player's viewpoint position; and the display step of displaying to the player the augmented reality video viewed from said player's viewpoint position.

Claim 11 recites all the limitations of claim 10 and adds the limitation of "the second video sensing step", "the second video generation step", "the second video composition step" and "display step." The Sato reference teaches an augmented reality presentation step including a video sensing step for sensing a video of the virtual object in HMD 100 along with a three-dimensional position/posture sensor 101 (column 12, lines 12-27). The Sato reference also teaches a video generation step of generating depth images in correspondence with the right and

left viewpoints of the player in a depth image generation apparatus 200 (column 12-50). Sato further teaches a video composition step of compositing an augmented reality video viewed from a player's viewpoint position in depth warping module 203 and a CG renderer 302 (column 13, lines 32-60 and column 14, lines 1-29). Finally, Sato teaches display step of displaying a rendered image in LCDs 103 (column 14, lines 1-29).

The Sato reference teaches in an alternative embodiment in figure 18 a program code of an augmented reality presentation step including a position/posture estimation module 201, an image generation module 300, a depth-warping module 203 and a CG renderer 302. The Sato reference teaches the position/posture estimation module 201 that estimates movement of the viewpoint on the basis of images input from the cameras 102R and 102L (column 15, lines 38-44). Sato also teaches a depth warping module 203 that receives the transformation matrices representing three-dimensional motions and outputs depth images corresponding to the positions/postures of right and left viewpoints (column 16, lines 21-33). The Sato reference also teaches an alternative image generation module 300 that merges and outputs real images and images from the CG renderer 302 (column 16, lines 35-43). The Sato reference further teaches that the CG renderer 302 renders a real image and depth image of CG data received from a three-dimensional database 301 on the basis of the viewpoint position/posture information of the camera input from the position/posture estimation module (column 16, lines 34-67) and generates the real image to be displayed and that alternatively the CG renderer 302 receives the warped depth image from the depth warping module 203 and real image from the camera and renders a real image that has the depth of the depth image and renders and overlays a virtual image by using ordinal depth-keying technique (column 16, lines 52-61).

Claim 12: *The apparatus according to claim 10, characterized in that said augmented reality presentation step further comprises: the second video generation step of generating a video of the virtual object viewed from said player's viewpoint position; and the display step of displaying to the player the video of the virtual object viewed from said player's viewpoint position on a display surface through which the player can visually see the real space.*

Claim 12 recites all the limitations of claim 10 and adds the limitation of "the second video generation step" and "the display step." The Sato reference teaches a video generation step of generating depth images in correspondence with the right and left viewpoints of the player in a depth image generation apparatus 200 (column 12-50). The Sato reference further teaches display step of displaying a rendered image in LCDs 103 (column 14, lines 1-29).

Claim 13: *The method according to claim 10, characterized by further comprising information generation step of generating information that pertains to rendering of the virtual object, and in that said first video generation step and said second video generation step generate videos of the virtual object using the information that pertains to rendering of the virtual object.*

Claim 13 recites all the limitations of claim 10 and adds the limitation of "information generation step" and "first and second generation steps generate videos." The Sato reference teaches an information generation step in which the CG renderer 302 renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint position/posture information (column 14, lines 1-29) and video generation steps in which the image generation module 300 generates an augmented reality image using the three-

dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image (column 12, lines 44-50).

Claim 14: *The apparatus according to claim 13, characterized in that said information generation step includes the step of generating information of an outer appearance of the virtual object and information of a position/posture of the virtual object as the information that pertains to rendering of the virtual object.*

Claim 14 recites all the limitations of claim 13 and adds the limitation of "generating information of an outer appearance of the virtual object and information of a position/posture of the virtual object." The Sato reference teaches an information generation step that the CG renderer 302 renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint *position/posture information* (column 14, lines 1-29) and the image generation module 300 generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image (column 12, lines 44-50).

Claim 15: *The method according to claim 10, characterized in that parameters of said first video sensing means are known, and said first video generation step includes the step of generating the video of the virtual object viewed from said first viewpoint position in accordance with the known parameters.*

Claim 15 recites all the limitations of claim 10 and adds the limitation of "the known parameters." The Sato reference teaches the known parameters such as the focal length of camera 102 (column 10, lines 62-67).

Claim 16: *The method according to claim 10, characterized in that some of parameters of means for sensing a video viewed from said first viewpoint position are variable, said method further comprises the measurement step of measuring changes of the parameters, and said first video generation step includes the step of generating the video of the virtual object viewed from said first viewpoint position in accordance with the parameters measured in the measurement step.*

Claim 16 recites all the limitations of claim 10 and adds the limitation of "variable parameters" and "measurement step." The Sato reference teaches the relative position/posture of the viewpoint of the camera 102 and the estimation module 201 to estimate a change in relative viewpoint position of the camera 102 viewed at different times on the basis of the time-sequentially extracted position/posture information of the camera 102 (column 5, lines 48-54). The Sato reference teaches measurement step in which the position/posture sensor 101 continuously outputs viewpoint position/posture information of the camera 102 along a time axis of the sensor 101 (column 8, lines 42-47).

Claim 17: *The method according to claim 16, characterized in that the parameters of the means for sensing a video viewed from said first viewpoint position measured in the measurement step include at least one of a viewpoint position/posture, and zoon ration.*

Claim 17 recites all the limitations of claim 16 and adds the limitation of "position/posture information." The Sato reference teaches the relative position/posture of the viewpoint of the camera 102 and the estimation module 201 to estimate a change in relative viewpoint position of the camera 102 viewed at different times on the basis of the time-sequentially extracted position/posture information of the camera 102 (column 5, lines 48-54).

Claim 18: *The method according to claim 10, characterized in that when a plurality of means for sensing a video viewed from said first viewpoint position are present, said method further comprises the selection step of receiving a plurality of videos of the real space viewed from a first viewpoint position from the plurality of means for sensing a video viewed from said first viewpoint position, and outputting the video of the real space viewed from a first viewpoint position input from one selected means for sensing a video of said first viewpoint position to means for compsiting a first viewpoint video, and said first video composition step includes the step of generating a video of the virtual object viewed from said first viewpoint position using parameters of the means for sensing a video viewed from a first viewpoint position selected in the selection step.*

Claim 18 recites all the limitations of claim 10 and adds the limitation of "selection step for receiving a plurality of videos." The Sato reference teaches a selection step in which a depth image is generated on the basis of an image from one camera (column 7, lines 1-14).

6. Claim 19:

The claim 19 encompasses the same scope of invention as that of claim 1 except additional claimed limitation of "a storage medium storing a program code. However, the Sato reference further discloses the claimed limitation of a storage medium that stores an image processing program, which is implemented on a computer and continuously presents three-dimensional images to an observer/player, storing a program code of an augmented reality, a depth estimation program code, a depth image generation program code, a position/posture information estimation program code, a warping program code and a program code of presenting to the observer three-dimensional images. The Sato reference implicitly teaches a program code

including the augmented reality presentation step of generating and presenting a virtual image in a real space in which an image of merged real objects and virtual objects are displayed in LCDs 103 in an optical see-through head mounted device (column 1, lines 13-23). The Sato reference also implicitly teaches a position/posture estimation module 201 that outputs three-dimensional motions from a viewpoint position of the camera to right and left viewpoint positions of the player (column 12, lines 54-65). The Sato reference further teaches a depth image generation module 300 that uses position/posture information input from the position/posture estimation module 201 as that for CG rendering and which generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image and presents it on the LCDs 103 (column 12, lines 44-50) and a depth warping module 203 to inversely project a depth image ID acquired at a viewpoint having position/posture information into a space, and to re-project it onto the imaging plane of the virtual camera with the focal length of the virtual camera assumed at the viewpoint having an estimated position/posture value by the viewpoint position/posture module 201 (column 13, lines 32-48).

Claim 20: *The medium according to claim 19, characterized in that the program code of the augmented reality presentation step further comprises: a program code of the second video sensing step of sensing a video of the real space viewed from said player's viewpoint position; a program code of the second video generation step of generating a video of the virtual object viewed from said player's viewpoint position; a program code of the second video composition step of compositing an augmented reality video viewed from said player's viewpoint position on the basis of said videos of the real space and the virtual object viewed from said player's*

viewpoint position; and a program code of the display step of displaying to the player the augmented reality video viewed from said player's viewpoint position.

Claim 20 recites all the limitations of claim 19 and adds the limitation of "a program code of the second video sensing step", "a program code of the second video generation step", "a program code of the second video composition step" and "a program code of display step." The Sato reference teaches a program code of an augmented reality presentation step including an alternative position/posture estimation module 201, an alternative image generation module 300, an alternative depth-warping module 203 and an alternative CG renderer 302 of the third embodiment. The Sato reference teaches the position/posture estimation module 201 that estimates movement of the viewpoint on the basis of images input from the cameras 102R and 102L (column 15, lines 38-44). Sato also teaches a depth warping module 203 that receives the transformation matrices representing three-dimensional motions and outputs depth images corresponding to the positions/postures of right and left viewpoints (column 16, lines 21-33). The Sato reference also teaches an alternative image generation module 300 that merges and outputs real images and images from the CG renderer 302 (column 16, lines 35-43). The Sato reference further teaches that the CG renderer 302 renders a real image and depth image of CG data received from a three-dimensional database 301 on the basis of the viewpoint position/posture information of the camera input from the position/posture estimation module (column 16, lines 34-67) and generates the real image to be displayed and that alternatively the CG renderer 302 receives the warped depth image from the depth warping module 203 and real image from the camera and renders a real image that has the depth of the depth image and

renders and overlays a virtual image by using ordinal depth-keying technique (column 16, lines 52-61).

Claim 21: *The medium according to claim 19, characterized in that the program code of the augmented reality presentation step further comprises: a program code of the second video generation step of generating a video of the virtual object viewed from said player's viewpoint position; and a program code of the display step of displaying to the player the video of the virtual object viewed from said player's viewpoint position on a display surface through which the player can visually see the real space.*

Claim 21 recites all the limitations of claim 19 and adds the limitation of "a program code of the second video generation step" and "a program of the display step." The Sato reference also teaches an alternative image generation module 300 that merges and outputs real images and images from the CG renderer 302 (column 16, lines 35-43). The Sato reference further teaches that the CG renderer 302 renders a real image and depth image of CG data received from a three-dimensional database 301 on the basis of the viewpoint position/posture information of the camera input from the position/posture estimation module (column 16, lines 34-67) and generates the real image to be displayed and that alternatively the CG renderer 302 receives the warped depth image from the depth warping module 203 and real image from the camera and renders a real image that has the depth of the depth image and renders and overlays a virtual image by using ordinal depth-keying technique (column 16, lines 52-61).

Claim 22: *The medium according to claim 19, characterized by further comprising a program code of the information generation step of generating information that pertains to rendering of the virtual object, and in that in the program code of said first video generation step*

and said second video generation step, videos of the virtual object are generated using the information that pertains to rendering of the virtual object.

Claim 22 recites all the limitations of claim 19 and adds the limitation of "a program code of the information generation step" and "videos of virtual objects are generated." The Sato reference teaches in figures 18 and 20 that the CG renderer 302 renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint position/posture information and the image generation module 300 generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image.

Claim 23: *The medium according to claim 22, characterized in that the program code of said information generation step includes the step of generating information of an outer appearance of the virtual object and information of a position/posture of the virtual object as the information that pertains to rendering of the virtual object.*

Claim 23 recites all the limitations of claim 22 and adds the limitation of "generating information of an outer appearance of the virtual object and information of a position/posture of the virtual object." The Sato reference teaches in figure 18 and 20 an information generation step that the CG renderer 302 renders an image and depth image of CG data received from the three-dimensional database 301 on the basis of the viewpoint *position/posture information* and the image generation module 300 generates an augmented reality image using the three-dimensional CG database in accordance with the distance to an object in the real world expressed by the depth image.

Claim 24: *The medium according to claim 19, characterized in that parameters of means for sensing said first viewpoint video are known, and the program code of said first video generation step includes the step of generating the video of the virtual object viewed from said first viewpoint position in accordance with the known parameters.*

Claim 24 recites all the limitations of claim 19 and adds the limitation of "the known parameters." The Sato reference teaches in particular the known parameters such as the focal length of each camera 102 (column 16, lines 21-33).

Claim 25: *The medium according to claim 19, characterized in that some of parameters of means for sensing a video viewed from said first viewpoint position are variable, the program code of said medium further comprises the measurement step of measuring changes of the parameters, and the program code of said first video generation step includes the step of generating the video of the virtual object viewed from said first viewpoint position in accordance with the parameters measured in the measurement step.*

Claim 25 recites all the limitations of claim 19 and adds the limitation of "variable parameters" and "measurement step." The Sato reference teaches measurement step in which the position/posture estimation module 201 estimates movement of the viewpoint on the basis of images input from the cameras 102R and 102L by tracking changes in coordinate value of feature points and the position on the real space of which is known (column 15, lines 38-67).

Claim 26: *The medium according to claim 25, characterized in that the parameters of the means of sensing a video viewed from said first viewpoint position measured in the measurement step include at least one of a viewpoint position/posture, and zoon ration.*

Claim 26 recites all the limitations of claim 25 and adds the limitation of "position/posture information." The Sato reference teaches in figure 18 a head mounted position/posture sensor 101 and camera 102. The Sato reference further teaches various schemes for estimating viewpoint position/posture on the basis of image input from the cameras 102R and 102L (column 16, lines 38-67).

Claim 27: *The medium according to claim 19, characterized in that when a plurality of means for sensing a video viewed from said first viewpoint position are present, said medium further comprises a program code of the selection step of receiving a plurality of videos of the real space viewed from a first viewpoint position from the plurality of means for sensing a video viewed from said first viewpoint position, and outputting the video of the real space viewed from a first viewpoint position input from one selected means for sensing a video of said first viewpoint position to means for compsiting a first viewpoint video, and the program code of said first video composition step includes the step of generating a video of the virtual object viewed from said first viewpoint position using parameters of the means for sensing a video viewed from a first viewpoint position selected in the selection step.*

Claim 27 recites all the limitations of claim 19 and adds the limitation of "selection step for receiving a plurality of videos." The Sato reference teaches in figure 18 a depth estimation module 202, a viewpoint position/posture estimation module, a depth warping module and an image generation module. The Sato reference further teaches a selection step in which a depth image is generated on the basis of an image from one camera (see also column 7, lines 1-14).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato U.S. Patent No. 6,445,815.

Referring to claims 28-30, the Sato reference discloses an augmented reality presentation system that generates and presents a virtual image in a real space (see figures 18-20 of Sato). The Sato reference teaches in figure 20 a video composition means that outputs display image for displaying on 103R and 103L. However, the reference is silent on a printing means in connection to the augmented reality presentation apparatus. It is common that a computer system has a printing means attached to them. Therefore, it would have been obvious to one having ordinary skill in the art to have incorporated a printing means in the augmented reality presentation apparatus of Sato because such construction is rather conventional. A person of ordinary skill in the art would be motivated to have incorporated a printing means to the Sato's augmented reality presentation apparatus to further provide a paper copy of still images of the real images that have been displayed on the display devices of Sato.

Remarks

7. Applicant's arguments, filed 02/28/2003, paper number 4, have been fully considered but they are not deemed to be persuasive.

8. Applicant argues in essence with respect to claim 1 and similar claims that:

"By these features, an augmented reality video (i.e., a virtual object superimposed in a real space) can be displayed according to both a player's viewpoint and a viewpoint that differs from the player's viewpoint (for example, according to the viewpoint of camera 103 in Fig. 1). Applicants submit that the cited art fails to disclose or suggest at least these features."

This is not found persuasive for the following reasons:

(a) The Examiner interprets "a player's viewpoint" as a viewpoint from a player who wears an HMD on his head (Applicants' specification, page 11, lines 4-7).

In figures 6, 16 and 18, column 4, lines 64-67 and column 5, lines 1-54 of Sato, it is stated that "The base 100 has the two cameras 102R and 102L for stereoscopically sensing a scene in front of them. Image signals Ir and Il that represent an environmental scene of a real space sensed by the respective cameras are sent to...a module 201 for estimating the relative position/posture of the viewpoint of the camera 102R..." and in figure 16 and column 12, lines 14-50 of Sato, it is stated that "First, the second embodiment requires a depth image at each viewpoint of the camera 102R. Second, depth images must be generated in correspondence with the right and left viewpoints of the observer..."

In column 15, lines 11-25, it is stated "Upon comparing the constructing elements of the system of the third embodiment in FIG. 18 with those of the system of the second embodiment shown in FIG. 16, the former system is different from the latter one in that the former system has no head mounted position/posture sensor 101 and a viewpoint position position/posture estimation module 201 can estimate movement of the viewpoint from an image acquired by one

camera 102. Since the third embodiment uses a video see-through HMD, the arrangement of an image generation module is also different from the second embodiment..."

In column 16, lines 44-61, column 13, lines 31-48, and column 18, lines 5-15 of Sato, it is stated that "when a virtual camera equivalent to the viewpoint of the observer (player) is assumed, the operation of the depth warping module 203 of the second embodiment is to inversely project a depth image aquired at a viewpoint having position/posture information into a space," and "Both three-dimensional position/posture sensor and camera may be used together in a modification" to the second and third embodiments.

As applied to the present application, Sato fulfills the amended claim limitation of "a player's viewpoint."

(b) The Examiner interprets "a viewpoint (a first viewpoint position as recited in claim 1) that differs from the player's viewpoint" as an objective viewpoint that is fixed at a predetermined position and posture (Applicant's specification, page 11, lines 25-26, page 12, lines 1-4). In figure 6 and column 4, lines 64-67 and column 5, lines 1-54 of Sato, it is stated that "The three-dimensional position/posture sensor 101 is mounted on the base 100..." and in figure 16 and column 12, lines 14-50 of Sato, it is stated that "the principle of the embodiment is applied to an optical see-through augmented reality presentation system...In order to accurately detect the viewpoint position, a three dimensional position/posture sensor 101 is provided to the HMD 100".

Moreover, in column 18, lines 5-15 of Sato, it is stated "The viewpoint position/posture estimation module in the first or second embodiment uses information from the three-dimensional position/posture sensor, and that in the third embodiment uses image information

from the cameras. *However, these embodiments can be practiced using either scheme. Further, both three-dimensional position/posture sensor and camera may be used together in a modification.* Sato clearly teaches that the second embodiment can use information from the camera and the third embodiment can use image information from the three-dimensional position/posture sensor. In another word, the sensor and camera can be used interchangeably.

As applied to the present application, Sato fulfills the claimed limitation of an objective viewpoint (a first viewpoint position of claim 1) that differs from the player's viewpoint that can be obtained both from the sensor/camera. The Examiner notes that the objective viewpoint from sensor/camera is different from the player's viewpoint obtained from camera 102R/102L or 102.

(c) In summary, Sato clearly teaches an augmented reality video that can be displayed according to both a player's viewpoint and a viewpoint which differs from the player's viewpoint (for example, according to the viewpoint of camera 102R and 102L in Fig. 16) and therefore Sato fulfills claim 1 as amended.

9. Applicant argues in essence that:

> "Applicants submit that Sato merely discloses a configuration for generating an augmented image according to a player's viewpoint, and it fails to disclose or suggest at least the features of Claim 1 of displaying an augmented reality video viewed from a player's position and viewed from an objective viewpoint."

This is not found persuasive because of the following reasons:

The Examiner interprets "a viewpoint (a first viewpoint position as recited in claim 1) that differs from the player's viewpoint" as an objective viewpoint that is fixed at a

predetermined position and posture (Applicant's specification, page 11, lines 25-26, page 12, lines 1-4). In figure 6 and column 4, lines 64-67 and column 5, lines 1-54 of Sato, it is stated that "The three-dimensional position/posture sensor 101 is mounted on the base 100..." and in figure 16 and column 12, lines 14-50 of Sato, it is stated that "the principle of the embodiment is applied to an optical see-through augmented reality presentation system...In order to accurately detect the viewpoint position, a three dimensional position/posture sensor 101 is provided to the HMD 100".

Moreover, in column 18, lines 5-15 of Sato, it is stated "The viewpoint position/posture estimation module in the first or second embodiment uses information from the three-dimensional position/posture sensor, and that in the third embodiment uses image information from the cameras. *However, these embodiments can be practiced using either scheme. Further, both three-dimensional position/posture sensor and camera may be used together in a modification.* Sato clearly teaches that the second embodiment can use information from the camera and the third embodiment can use image information from the three-dimensional position/posture sensor. In another word, the sensor and camera can be used interchangeably.

As applied to the present application, Sato fulfills the claimed limitation of an objective viewpoint (a first viewpoint position of claim 1) that differs from the player's viewpoint that can be obtained both from the sensor/camera. The Examiner notes that the objective viewpoint from sensor/camera is different from the player's viewpoint obtained from camera 102R/102L or 102.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jin-Cheng Wang whose telephone number is (703) 605-1213. The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-6606 for regular communications and (703) 308-6606 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 395-3900.

jcw
March 12, 2003

JEFFERY BRIER
PRIMARY EXAMINER